

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A device for short-cycle arc welding of an element to a component ~~elements, especially metal studs, to components, especially metal sheets~~, the device comprising:

a positioning mechanism;

~~that holds~~ a welding head positionable relative to the ~~the~~ [[a]] component by the positioning mechanism, the welding head having a chucking mechanism operably ~~[[for]] holding the~~ [[an]] element, a ~~linear~~ motion mechanism operably ~~[[for]]~~ advancing and retracting the chucking mechanism relative to the welding head; ~~[[,]]~~ and

a feed channel operably ~~[[for]]~~ feeding the element ~~elements~~ to be welded into the chucking mechanism by use of gas pressure, at least a segment of the feed channel extending through the motion mechanism and being coaxially aligned with the chucking mechanism; and

the chucking mechanism being ~~includes~~ ~~radially movable chucking elements movable by a driven chucking means~~ between an open position, which permits axial passage of the ~~the~~ [[an]] element from the feed channel through the chucking mechanism ~~device~~, and a chucking position, in which the ~~an~~ element is chucked ~~between the chucking elements~~;

wherein the chucking mechanism in the open position creates ~~forms~~ a free passage for the element ~~elements~~ to be welded from ~~that~~ ~~adjoins~~ the feed channel and ~~leads~~ out of the welding head.

2. (original) The device of claim 1, wherein the chucking mechanism comprises an axially movable clamping nosepiece that works together with the chucking elements to move them between the open and chucking positions.

3. (original) The device of claim 2, further comprising a plurality of angled surfaces for coupling the clamping nosepiece and the chucking elements together in order to convert an axial displacement of the clamping nosepiece into one of a chucking and a release motion of the chucking elements.

4. (original) The device of claim 2, wherein the clamping nosepiece further comprises an axially movable clamping nosepiece movable toward the feed channel in order to move into the chucking position.

5. (original) The device of claim 2, further comprising a conically shaped inner surface positionable on a plurality of outer angled surfaces on the chucking elements, the inner surface acting with the clamping nosepiece.

6. (original) The device of claim 2, wherein the chucking elements further comprise a plurality of self-centering chucking elements.

7. (original) The device of claim 2, further comprising:
the chucking elements having an approximate wedge shape and being extendable toward the clamping nosepiece; and
a clamping nut locatable on a chucking element side facing away from the clamping nosepiece for movably retaining the chucking elements.
8. (original) The device of claim 2, comprising a drive provided for bracing the clamping nosepiece against the chucking elements.
9. (original) The device of claim 8, wherein the drive comprises a linear motor.
10. (original) The device of claim 8, wherein the drive comprises a fluid cylinder.
11. (original) The device of claim 8, comprising a motor drive, selectable as a linear motor, provided on the linear motion mechanism for each of advancing and retracting the chucking mechanism.
12. (original) The device of claim 1, comprising a pressure sensor provided to monitor a pressure inside the clamping mechanism, a signal therefrom being provided to an analysis unit for analysis in order to emit a signal that is characteristic of the feeding of an element to the component surface.

13. (original) The device of claim 1, comprising a measurement voltage applicable between the chucking mechanism and the component, the measurement voltage suppliable to an analysis unit for analysis in order to emit a signal that is characteristic of the feeding of an element to the component surface.

14. (currently amended) ~~The device of claim 1, comprising:~~ A device for short-cycle arc welding of an element to a component, the device comprising:

a positioning mechanism;

a welding head positionable relative to the component by the positioning mechanism, the welding head having a chucking mechanism operably holding the element, a motion mechanism operably advancing and retracting the chucking mechanism relative to the welding head;

a feed channel operably feeding the element to be welded into the chucking mechanism;

the chucking mechanism being movable between an open position, which permits axial passage of the element from the feed channel through the chucking mechanism, and a chucking position, in which the element is chucked;

wherein the chucking mechanism in the open position creates a free passage for the element to be welded from the feed channel and out of the welding head;

an intermediate storage; and

a storage device;

wherein the feed channel is coupled through the intermediate storage to the storage device, the storage device feeding the elements to be welded.

15. (original) The device of claim 14, comprising a maximum distance of one meter separating the intermediate storage from the workpiece opening of the chucking mechanism.

16. (original) The device of claim 14, comprising a maximum distance of 0.5 meters separating the intermediate storage from the workpiece opening of the chucking mechanism.

17. (original) The device of claim 14, comprising:
a chamber of the intermediate storage for accommodating an element to be welded, the element having closed axial ends; and
a plurality of pneumatic closures operable to close the closed axial ends.

18. (original) The device of claim 17, comprising at least one sensor for stud length detection provided in the chamber.

19. (original) The device of claim 17, comprising a feed line for feeding a gas into the chamber and an exhaust line for removing the gas from the chamber, each of which is controllable by a valve open onto the chamber.

Claims 20-26 (cancelled).

27. (currently amended) An arc welding system comprising:

a welding head positionable relative to a workpiece, the welding head having a chucking mechanism engageably holding an element, a first linear actuator ~~motion mechanism~~ operable to radially open and close the chucking mechanism, and a second linear actuator ~~motion mechanism~~ operable to advance and retract the chucking mechanism relative to the welding head; and

a feeding channel extending through the actuators;

the chucking mechanism including a plurality of radially movable chucking elements, each radially displaceable in response to an axial displacement of the first linear actuator ~~motion mechanism~~ between an open position, permitting free axial passage of the element through the chucking device, and a chucking position, having the element chucked between the chucking elements;

wherein after the element passes freely through the chucking device and contacts the workpiece, and the first linear actuator ~~motion mechanism~~ displaces in a first axial direction to position the chucking elements in the chucking position, the second linear actuator ~~motion mechanism~~ subsequently displaces longitudinally in a second axial direction toward the workpiece, opposite the first axial direction, and advances the element for welding.

28. (original) The arc welding system of Claim 27, comprising a conical nosepiece connectable to the first linear motion mechanism, the conical nosepiece positionable to directly contact the chucking elements to radially displace the chucking elements upon displacement of the first linear motion mechanism in the first direction.

29. (currently amended) An arc welding machine, comprising:

a welding head having a chucking mechanism operably holding one of a plurality of elements to be welded, a first motion mechanism operable to radially open and close the chucking mechanism, and a second motion mechanism operably advancing and retracting the chucking mechanism relative to the welding head;

a positioning mechanism remote from the welding head to position the welding head;

a movable ~~linkage~~ member joining the welding head to the positioning mechanism;

a storage chamber supportable by and movable with the ~~linkage~~ member, the storage chamber being operable to temporarily store individual ones of the elements to be welded; and

a feed channel providing ~~an open passageway for the element to~~ through the welding head ~~when the chucking mechanism is in an open position~~, the feed channel being in communication with the storage chamber.

30. (original) The machine of Claim 29, comprising a storage device positionable remote from both the welding head and the storage chamber, the storage device operable to store for transfer to the storage chamber the elements to be welded.

31. (original) The machine of Claim 30, comprising a feed line linking the storage device to the storage chamber.

32. (currently amended) A welding head for engaging individual items, the welding head comprising:

a chucking mechanism operable to hold one of the items, the chucking mechanism including a plurality of radially movable chucking elements;

a first electromagnetic mechanism operable to radially open and close the chucking mechanism;

a substantially conical-shaped nosepiece connectable to the first mechanism, the nosepiece positionable in direct contact with the chucking elements to radially displace the chucking elements;

a second electromagnetic mechanism operable to longitudinally advance and retract the nosepiece ~~chucking mechanism~~; and

a feed channel disposed through the welding head and through at least one of the electromagnetic mechanisms to deliver the items ~~for welding~~ to the chucking mechanism.

33. (original) The welding head of Claim 32, further comprising:

an inner cylinder connectable to the second mechanism;

an outer cylinder connectable to the first mechanism, the outer cylinder positioned external to the inner cylinder; and

at least one sleeve bearing positioned between the inner and outer cylinders to permit a sliding engagement of the inner cylinder and the outer cylinder.

34. (new) The welding head of Claim 32 further comprising:

a workpiece;

the items including a weld stud; and

a controller connected to at least one of the electromagnetic mechanisms, the controller automatically controlling at least one of the electromagnetic mechanisms to subsequently cause the chucking mechanism to apply a pulling force on the weld stud in a direction away from the workpiece to which it has been welded, in order to test the weld strength.

35. (new) The welding head of Claim 32 further comprising:

an analysis unit operably monitoring welding element-clamping force of the chucking mechanism as a function of a characteristic of at least one of the electromagnetic mechanisms.

36. (new) The welding head of Claim 32 further comprising:

a feeder adapted to move the items to the chucking mechanism by use of gas pressure; and

a sensor operably monitoring the gas pressure adjacent the chucking mechanism.

37. (new) The welding head of Claim 32 wherein the chucking mechanism comprises an axially movable clamping nosepiece that works together with the chucking elements to move them between the open and chucking positions.

38. (new) The welding head of Claim 37 further comprising:

the chucking elements having an approximate wedge shape and being extendable toward the clamping nosepiece; and

a clamping nut locatable on a chucking element side facing away from the clamping nosepiece for movably retaining the chucking elements.

39. (new) The welding head of Claim 32 comprising:

an intermediate storage;

a storage device; and

a feed channel coupled through the intermediate storage to the storage device, the storage device feeding the elements to be welded.

40. (new) An arc welding system comprising:

a workpiece;

a weld stud;

a feeding tube;

a welding head including chucking members movable from a welding stud-engaging position to an open position; and

gas pressure causing the weld stud to sequentially move through the feeding tube, through at least part of the welding head and at least partially extending external to the welding head;

wherein the weld stud contacts against the workpiece prior to engagement by the chucking members and at least part of the weld stud remains within the nosepiece before chucking.

41. (new) An arc welding system comprising:
chucking members movable from a weldable member-engaging position to an open position;
a first electromagnetic actuator operably moving the chucking members;
a nosepiece located adjacent the chucking members, the nosepiece having an opening adapted to allow weldable element-passage therethrough; and
a second electromagnetic actuator operably advancing and retracting the nosepiece substantially independently of the chucking members;
wherein the nosepiece is retractable away from a workpiece position before the chucking members are in their fully engaging positions.

42. (new) The system of Claim 27 wherein the actuators are electromagnetic actuators and the feeding channel is coaxially aligned with the chucking mechanism.

43. (new) The system of Claim 27 wherein the actuators are coaxially aligned with each other.

44. (new) The system of Claim 27 further comprising weld studs fed through the channel.